

CLAIMS

What is claimed is:

1. In an internetwork comprising a plurality of coupled autonomous systems, wherein
2 the plurality of coupled autonomous systems communicate routing information via a
3 Border Gateway Protocol (BGP), and the internetwork includes a routing overlay network
4 to communicate routing parameters between the plurality of coupled autonomous systems,
5 a BGP update message comprising:

6 a Network Layer Reachability Information (NLRI) field, the NLRI field including:

7 a first network prefix; and

8 a first network mask;

9 an origin attribute, the origin attribute including an identifier for the routing
10 overlay network; and

11 a first community attribute, the first community attribute including:

12 an identifier for a private autonomous system from the plurality of

13 autonomous systems.

1. 2. The BGP update message of claim 1, wherein the BGP update message is
2 transmitted from the routing overlay network to one or more points of presence in the
3 plurality of coupled autonomous systems.

1. 3. The BGP update message of claim 1, wherein the first network prefix and the first
2 network mask comprise a first classless address, the first classless address identifying a
3 first internetwork destination.

1. 4. The BGP update message of claim 3, wherein the first classless address is a
2 member of an equivalence class of addresses, the equivalence class including a plurality of
3 classless network addresses, wherein the plurality of classless network addresses are in
4 geographical proximity.

1. 5. The BGP update message of claim 3, wherein the first classless address is a
2 member of an equivalence class of addresses, the equivalence class including a plurality of
3 classless network addresses, wherein the plurality of classless network addresses have
4 jitter statistics within a pre-defined threshold.

1 6. The BGP update message of claim 3, wherein the first classless address is a
2 member of an equivalence class of addresses, the equivalence class including a plurality of
3 classless network addresses, wherein the plurality of classless network addresses have
4 packet loss statistics within a pre-defined threshold.

1 7. The BGP update message of claim 3, wherein the first classless address is a
2 member of an equivalence class of addresses, the equivalence class including a plurality of
3 classless network addresses, wherein the plurality of classless network addresses have
4 packet delay statistics within a predefined threshold.

1 8. The BGP update message of claim 3, wherein the first classless address is a
2 member of an equivalence class of addresses, the equivalence class including a plurality of
3 classless network addresses, wherein the plurality of classless network addresses have
4 similar jitter, delay, and loss statistics within a pre-determined threshold.

1 9. The BGP update message of claim 8, wherein the equivalence class includes a
2 second classless address, the second classless address including:
3 a second network prefix; and
4 a second network mask.

1 10. The BGP update message of claim 9, wherein the second classless address
2 identifies a second internetwork destination.

1 11. The BGP update message of claim 10, further comprising:
2 a second community attribute, the second community attribute including:
3 the identifier for the private autonomous system; and
4 a scalar identifier for the equivalence class.

1 12. The BGP update message of claim 11, wherein the identifier for the routing
2 overlay network is 65534.

1 13. The BGP update message of claim 12, wherein the identifier for the private
2 autonomous system has the value 65001.

1 14. In an internetwork comprising a plurality of coupled autonomous systems, wherein
2 the plurality of coupled autonomous systems communicate routing information via a

3 Border Gateway Protocol (BGP), and the internetwork includes a routing overlay network
4 to communicate routing parameters between the plurality of coupled autonomous systems,
5 a method of identifying a classless network address as a member of an equivalence class,
6 the equivalence class comprising a plurality of classless addresses, wherein a route for the
7 classless address has already been advertised to the plurality of coupled autonomous
8 systems, the method comprising:

9 generating a BGP update message, the BGP update message including:

10 a destination network for the classless address;

11 a network mask for the classless address;

12 an Autonomous System (AS) Path attribute, the AS Path attribute

13 having a value of the route for the network destination; and

14 a first community attribute, the community attribute including:

15 an identifier for a private autonomous system from the

16 plurality of coupled autonomous systems; and

17 forwarding the BGP update message from the routing overlay network to
18 the plurality of coupled autonomous systems.

1 15. The method of claim 14, wherein the first community attribute is a scalar with a
2 value 65001.

1 16. The method of claim 15, wherein the first community attribute further includes a
2 value 0.

1 17. The method of claim 14, wherein the plurality of classless addresses in the
2 equivalence class have similar network performance characteristics.

1 18. The method of claim 17, wherein the plurality of classless addresses are in
2 geographic proximity.

1 19. The method of claim 17, wherein the similar network performance characteristics
2 include one or more of delay statistics, jitter statistics, and loss statistics.

1 20. The method of claim 17, wherein the BGP update message further includes a
2 second community attribute, the second community attribute including:
3 the scalar with the value 65001; and

4 a unique scalar identifier for the equivalence class.

1 21. In an internetwork comprising a plurality of coupled autonomous systems, wherein
2 the plurality of coupled autonomous systems communicate routing information via a
3 Border Gateway Protocol (BGP) and the internetwork includes a routing overlay network
4 to communicate routing parameters between the plurality of coupled autonomous systems,
5 a method of communicating network performance parameters for a route in the
6 internetwork, the method comprising:

7 advertising a BGP update message from a point of presence in the internetwork to
8 the routing overlay network; and

9 prior to advertising the BGP update message, generating the BGP update message,
10 the BGP update message including:

11 a classless address for a network destination of the route, the classless
12 address further including:

13 an identifier for the network destination; and

14 a mask for the network destination;

15 an autonomous system path attribute, indicating a chain of autonomous
16 systems from the plurality of coupled autonomous systems traversed by the route;
17 and

18 a community string including:

19 a first hop autonomous system indicating an ISP coupled to the
20 point of presence; and

21 one or more value pairs including:

22 a type, indicating a type of performance measurement of the
23 route; and

24 an argument, indicating a value of the performance
25 measurement of the route.

1 22. The method of claim 21, wherein the one or more value pairs includes a value pair
2 indicating jitter measurements for the route, such that the type identifies the jitter
3 measurement as jitter for the route, and the argument indicates the value for the jitter.

1 23. The method of claim 21, wherein the one or more value pairs includes a value pair
2 indicating packet drop measurement for the route, such that the type identifies the

3 measurement as packet drop for the route, and the argument indicates the value for the
4 packet drop.

1 24. The method of claim 21, wherein the one or more value pairs includes a value pair
2 indicating delay measurement for the route, such that the type identifies the measurement
3 as delay for the route, and the argument indicates the value for the delay as delay.

1 25. The method of claim 21, wherein the autonomous path attribute includes an
2 identifier for the routing overlay network.

1 26. The method of claim 25, wherein the identifier for the routing overlay network is
2 65534.

1 27. In an internetwork comprising a plurality of coupled autonomous systems, wherein
2 the plurality of coupled autonomous systems (ASs) communicate routing information via a
3 Border Gateway Protocol (BGP) and the internetwork includes a routing overlay network
4 to communicate routing parameters between the plurality of coupled autonomous systems,
5 a method of exchanging routing information between a source network and a destination
6 network coupled to the internetwork, the method comprising:

7 inserting a BGP community into a BGP feed, the BGP community including:
8 a cooperative private autonomous system field, the cooperative private
9 autonomous system field being between 65001 and 65100; and
10 a corresponding value corresponding to the cooperative private autonomous
11 system field; and
12 exchanging the BGP feed between the source network and the destination network
13 via the routing overlay network.

1 28. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value of 65001, indicating that the value is an identifier of an equivalence class, the
3 equivalence class including a group of network addresses.

1 29. The method of claim 28, wherein the group of network addresses exhibit similar
2 network performance characteristics.

1 30. The method of claim 28, wherein the group of network addresses have similar
2 measurements for jitter.

1 31. The method of claim 28, wherein the group of network addresses have similar
2 measurements for packet loss.

1 32. The method of claim 28, wherein the group of network addresses have similar
2 measurements for packet delay.

1 33. The method of claim 28, wherein the group of network addresses are
2 geographically proximate.

1 34. The method of claim 27, wherein the cooperative private autonomous system field
2 is 65002, such that the cooperative private autonomous system field indicates a request for
3 symmetric AS path routing.

1 35. The method of claim 34, wherein the corresponding value is zero.

1 36. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65003, indicating that paths with the AS are preferred with first priority.

1 37. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65004, indicating that paths with the AS are preferred with second priority.

1 38. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65005, indicating that paths with the AS are preferred with third priority.

1 39. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65006, indicating that paths with the AS are to be avoided with first priority.

1 40. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65007, indicating that paths with the AS are to be avoided with second priority.

1 41. The method of claim 27, wherein the corresponding value is an AS from the
2 plurality of coupled ASs, and the cooperative private autonomous system field has a value
3 65008, indicating that paths with the AS are to be avoided with third priority.

1 42. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 65009, indicating a black hole Denial of Service Attack

1 43. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 650010 indicating a rate limit Denial of Service Attack.

1 44. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 65011, indicating an informational Denial of Service Attack.

1 45. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 65012, indicating unacceptable packet loss.

1 46. The method of claim 45, wherein the corresponding value indicates a packet loss
2 number.

1 47. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 65013, indicating unacceptable jitter.

1 48. The method of claim 47, wherein the corresponding value indicates a jitter number.

1 49. The method of claim 27, wherein the cooperative private autonomous system field
2 has a value 65014, indicating a performance metric.

1 50. The method of claim 49, wherein the corresponding value is a scalar value of the
2 performance metric.